

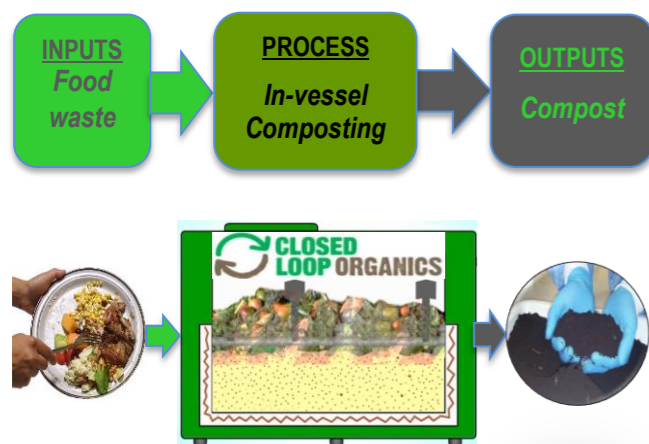
RP 2019

THE MICROBIAL ECOLOGY OF URBAN ORGANIC WASTE TREATMENT (COMPOST)

Research Question

- **What is the time necessary for in-vessel composting, to produce stable, high-quality compost?**
- **Is the final product from in-vessel composting free of pathogens?**
- **How does the quality of final compost depend on the type of inputs?**

Figure 1: "Closed Loop" in-vessel compost production.



Methodology

My research explores three main components:

1. Inputs (*food waste*),
2. Process (*in-vessel composting*)
3. Outputs (*compost*).

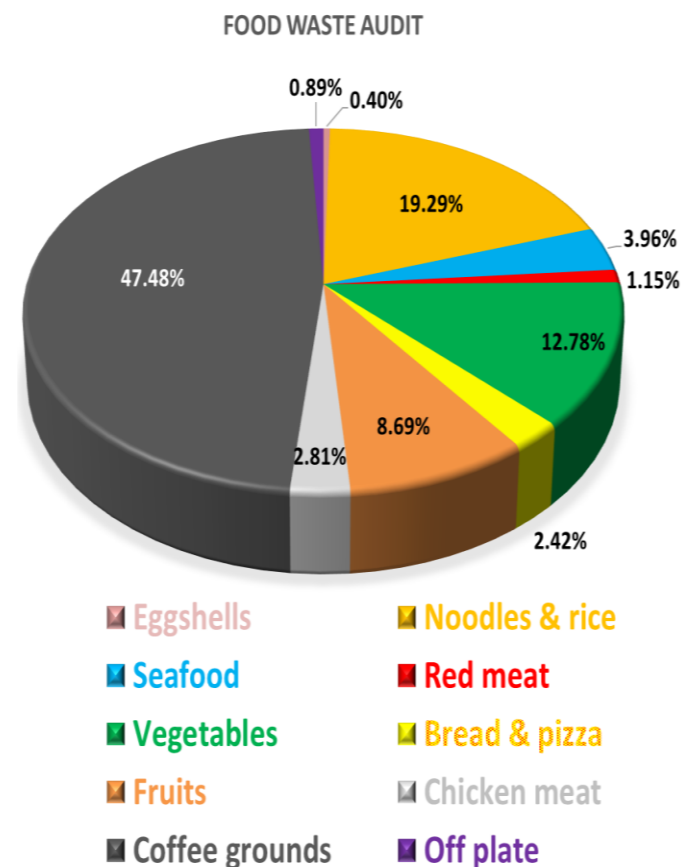
Measured parameters include, food waste content, temperature, pH, electrical conductivity, moisture, C:N ratio, volatile organic compounds.

The cellular microbial communities, including pathogens, present during the composting process and in the final compost will be determined.

Results

Food waste from the Swinburne University of Technology café precinct was collected and audited.

Figure 2: Types and percentages of food waste from café precinct.

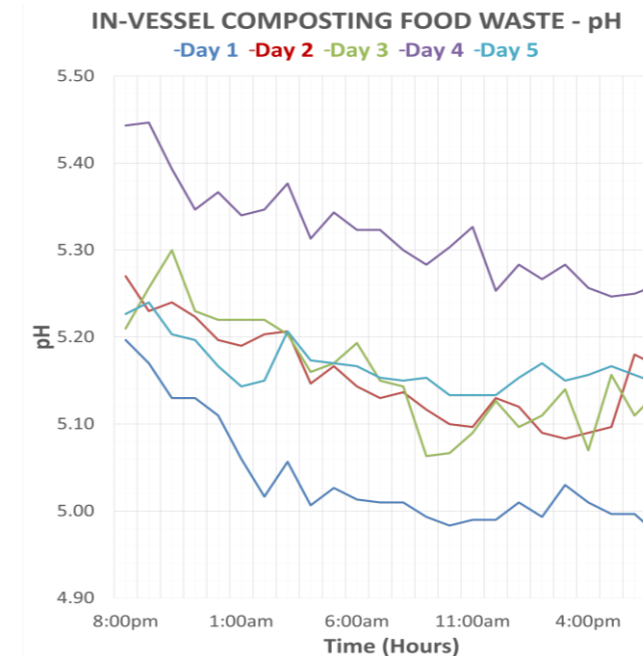


Composting is an aerobic process, based on biological decomposition. For best decomposition, the microorganisms require optimal parameters (see Methodology) leading to high-quality, safe final compost.

If some critical parameters such as pH, moisture, temperature or gas exchange, is not ideal, microbial activity could be reduced, even generating anaerobic conditions resulting in unwanted fermentation processes.

The initial pH was low (5.2-5.44) and trended downwards during the 24 hours composting process.

Figure 3: pH of 24 hours in-vessel composting food waste from café precinct.



Conclusions

In-vessel composters are a commercial modern technology for the treatment of organic waste. However, from preliminary results (specifically pH data) using the 24 hr "Closed Loop" process, it could be that the final compost product is unsuitable for immediate application and may require further treatment.

Anticipated impacts

Making compost is not an easy task. It requires knowledge of the chemical and microbial analyses. This research will provide optimal conditions which can be used as a "recipe" for in-vessel rapid, pathogen-free, high-quality compost production for use in the agriculture or gardening sector.

Composting organic waste produces a soil amendment for sustainable food production. Compared to other treatment processes (landfilling), composting reduces greenhouse gas production, thus contributing to global warming mitigation. This research will investigate the efficacy of short-term in-vessel composting processes.

Further information

Find more information here:

<http://www.foodcompostfood.org/>

<http://www.lowcarbonlivingcrc.com.au/research/program-2-low-carbon-precincts/rp2019-co2-reduction-and-food-production-household-and>

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